

**Modifications To  
Standard Specifications**

**STANDARD SPECIFICATIONS**  
**CITY OF EDMONDS MODIFICATIONS**  
**DIVISION 2 – EARTHWORK**

**2.09        STRUCTURE EXCAVATION**

**2.09.1      Description**

This section covers the work necessary for trench excavation and backfill for all pipelines, complete.

A.      Trench Excavation

Excavation is unclassified. Complete all excavation regardless of the type of materials encountered. The contractor shall do an estimate of the kind and extent of the various materials that will be encountered in the excavation.

B.      Type of Bedding

Bedding consists of pipe base and pipe zone material. Pipe zone material shall be required for all pipe. Pipe base material will be required for pipes except ductile iron pipe. Pipe base material for ductile iron shall be required when, in the opinion of the Engineer, the native trench bottom is not suitable for laying pipe.

C.      Types of Backfill

For bidding purpose, the class of backfill to be used above the pipe zone is indicated on the plans or class C if not shown. The City reserves the right to modify the use, location, and quantities of the various types of backfill during construction according to the established bid item prices. The Engineer will designate the type of backfill to be used in each location throughout the construction of the project. The general classifications of backfill are as listed below:

1.      Class B

Class B backfill will be used in unsurfaced areas where compaction and subsequent settlement are not critical.

2.      Class C

Class C backfill will be used in unsurfaced areas or road shoulders where reseeding, sod replacement, or shoulder replacement will be required. Compaction in these applications is important, as the subsequent settlement must be held to a minimum.

3.      Class D

Class D backfill will be used in unsurfaced and surfaced areas where compaction is critical to ensure that no settlement occurs. Pavement replacement and shoulder replacement will be made shortly after backfilling.

D.      Water for Trench Compaction

The contractor shall make all arrangements for a source of water. All City water shall be metered and supervised by the City. The contractor shall be responsible for any deposit fees.

E. Concrete

Concrete shall be as specified in Section 6-02.3 Concrete Structures and shall have a minimum twenty-eight (28) day compressive strength of 3000 psi.

**2.09.3** Construction Requirements

A. Surface Preparation for Excavation

Conform to subsection 2.01.1 Clearing

B. Trench Excavation and Shoring

1. Open Trench Limited

The length of trench excavated in advance of the pipe laying operation shall be kept to a minimum, and in no case shall it exceed three hundred (300) feet, unless specifically authorized by the Engineer.

2. Trench Width

Contractor shall conform to state and federal laws. Minimum width of unsheeted trench in which pipe is to be laid shall be eighteen (18) inches greater than the outside diameter of the pipe, or as approved. Sheet piling requirements on each side shall be independent of trench widths.

The maximum permissible trench width from the bottom of the trench to the crown of the pipe shall be as follows:

15 inch diameter and smaller	40 inches
18 inch diameter and larger	1-1/2 times the inside diameter of the pipe plus 18 inches

If the maximum trench width at the crown of the pipe is exceeded by the contractor without the written authorization of the Engineer, the contractor will be required, at his own expense, to provide pipe of higher strength classification or to provide a higher class of bedding, as approved by the Engineer.

Maximum permissible trench widths shall be as shown on the plans. If the maximum permissible trench width is exceeded, contractor shall be solely responsible for all costs associated with the additional trench width including, but not limited to, backfill and surface restoration.

3. Trench Safety Systems

Safety systems shall be provided in conformance to Washington Industrial Safety and Health Act, Chapter 49.17 RCW.

4. Grade

Excavate the trench to the lines and grades shown or as established by the Engineer (Section 1-05.4) with proper allowance for pipe thickness and for pipe bedding (base) material as required. If the trench is excavated below the required grade, correct any part of the trench excavated below the grade with material of the type specified for pipe bedding at no additional cost to the City.

5. Bell (Joint) Holes

At the location of each joint, the contractor shall dig bell (joint) holes of ample dimensions in the bottom of the trench and at the sides where necessary to permit the joint to be made properly and to permit easy visual inspection of the joint.

6. Disposal of Excess Excavated Material

Contractor shall make arrangements for the disposal of all excess material and bear all costs.

7. Shoring, Sheet piling, and Bracing of Trenches

All sheet piling, shoring, and bracing of trenches shall conform to the safety requirements of the federal, state, or local public agency having jurisdiction and as required to protect the pipe. The most stringent of these requirements shall apply.

8. Location of Excavated Materials

During trench excavation, contractor shall place the excavated material only within the construction easement, right-of-way, or approved working area in such a manner that it will cause a minimum of inconvenience to the traveling public and provide for merging traffic where necessary. Contractor shall not obstruct both lanes of traffic on any private or public traveled roadways or streets. The contractor shall also take the necessary steps to control erosion of the excavated material.

C. Dewatering

The contractor shall furnish, install, and operate all necessary machinery, appliances, and equipment to keep excavations free from water during construction, and shall dewater and dispose of the water so as not to cause injury to public or private property or to cause a nuisance or a menace to the public.

D. Bedding

1. General

Where no reference is made to the classification of bedding on the plans or in the special conditions, bedding shall be selected granular bedding.

When, in the opinion of the Engineer, selected bedding material is unsatisfactory, the contractor shall furnish imported granular bedding material which has been approved by the Engineer.

2. Pipe Base

Level the bottom of the trench or the top of the foundation material at such elevations as shown on the plans. Base material shall provide a firm support along, entire pipe length. If the trench is over excavated, rebuild the over excavated section of the trench with compacted, imported granular pipe base material at no additional cost to the City.

Pipe base shall be considered to cover the full width of the excavated trench from the bottom of the trench or top of foundation stabilization material to the top of the base as specified or as shown on the plans.

3. Pipe Zone

After the pipe is in place and ready for backfilling, place pipe zone material at approximately the same rate on each side of the pipe to insure proper alignment. The material shall be rammed and tamped around the pipe by the use of shovels or other approved hand-held tools so as to provide firm and uniform support over the full length of all pipe, valves and fittings. Care shall be taken to prevent any damage to the pipe.

4. Concrete Bedding

Concrete bedding shall be placed in special areas as shown on the plans.

E. Trench Backfill

1. General

When backfill is placed mechanically, push the backfill material onto the slope of the previously placed and allow the material to slide down into the trench. Do not push backfill into the trench in such a way as to permit free fall until two (2) feet of cover or more is provided over the top of the pipe. Under no circumstances, allow sharp or heavy pieces of material to drop directly onto the pipe or the tamped material around it. All backfill, regardless of class, shall be placed in successive layers not to exceed eight (8) inches in loose thickness and each layer shall be compacted to the density specified herein. At no time shall backfill material be placed in the trench if the moisture content exceeds two percent (2%) of optimum moisture for the approved backfill material. If the moisture content is less than two percent (2%) of the optimum, additional water may be required based on the recommendations of the City's soils testing consultant or approval from the City Engineer.

Backfilled trenches shall be reasonably smooth, free from ruts and material neatly windowed over the trench and excess removed. **If the trench is over driveways, roadways or paved shoulders, the surface shall be temporarily covered with two (2) inches of cold mix per the standard trench detail.** Unpaved surfaces shall have material neatly mounded not more than six (6) inches above the existing ground for the entire width of the trench. Estimate and provide the amount of backfill material required so after normal settlement, the finished surface will meet the existing grade. Any excess or deficiency after normal settlement shall be corrected accordingly.

Screen all boulders and stones from the backfill material that are two (2) inches in diameter or larger in the upper twelve (12) inches of the backfill.

When, in the opinion of the Engineer, selected backfill material is unsatisfactory, the contractor shall furnish imported backfill material as approved by the Engineer.

2. Class B Backfill

Backfill the trench above the pipe zone and compact to ninety percent (90%) of maximum density as determined by ASTM D1557 (see 1-06.2). Determine the type of compaction required to prevent subsequent settlement.

3. Class C Backfill

Backfill the trench above the pipe zone and compact to ninety percent (90%) of the maximum density as determined by ASTM D1557 (see 1-06.2). Determine the type of compaction required to prevent subsequent settlement.

4. Class D Backfill

Backfill the trench above the pipe zone with approved backfill material to a minimum of ninety-five percent (95%) as determined by ASTM D1557 (see 1-06.2).

If the native material does not comply with the specifications, the contractor shall use imported material as approved by the Engineer.

5. Maintenance of Trench Backfill

Any subsequent settlement of the finished surface during the warranty period shall be considered a result of improper or insufficient compaction and/or excessive moisture content and shall be promptly repaired by the contractor at no cost to the City.

Maintain the backfilled trench surface until the following applicable operations have been completed and approved by the Engineer:

- a. Service connections, installed and backfilled.
- b. Valves, valve boxes, and hydrants installed.
- c. Pressure testing.
- d. Cleaning, flushing, and sterilization.
- e. Cleanup and restoration of all physical features.
- f. Utilities restored to their original condition or better.
- g. All work required between the two valves or manholes accomplished, with the exception of final surfacing.

This maintenance shall include, but not limited to, keeping the surface of backfilled trenches reasonably smooth, free from ruts and potholes, and suitable for normal traffic flow, where applicable.

No additional payment will be made for the maintenance of the trench backfill before completion of the work outlined above, except for cold mix asphalt when directed or requested by the Engineer.

No final pavement replacement shall be undertaken until all items outlined above have been completed and approved by the Engineer.

Maintenance of backfilled trenches is considered to be incidental to this item of work, and payment for such maintenance will be considered as included in payment for class of backfill.

F. Compaction of Backfill

Mechanical compaction is generally recommended for trenches. Contractor will supply, operate and maintain the proper equipment to compact the classification of material relative to the field conditions. Water settlement may be used to compact sand, pit run, and gravel type backfills. If the contractor desires to use water settling, he shall submit in detail to the Engineer for approval, the procedure to be used. The contractor, as directed by the Engineer and at no additional cost, shall excavate test holes to review the effectiveness of compaction. If, in the opinion of the Engineer, the specified compaction and densities are not being achieved in accordance with 1-06.2, the contractor shall recompact the backfill material. If required, water saturated material shall be removed, dried, and placed back in lifts or replaced with imported backfill material. The contractor shall be responsible for all costs for labor, materials, and delays resulting from improper compaction and recompaction.

G. Embankments

1. Structural Embankment

Construct embankment to support the pipeline in accordance with the details shown on the plans. Spread excess excavated trench material in maximum one (1) foot lifts for the full width of the embankment cross section and compact to a minimum of ninety-five percent (95%) of maximum density for the full depth of the fill as determined by ASTM D1557 (see 1-06.2). Compact the embankment to its final cross section before the trench excavation for the pipe is made.

2. Additional Pipe Cover

In locations where insufficient pipe cover exists, place selected native material over the pipe as shown or directed to provide a minimum cover of three (3) feet. Slope pipe cover to prevent blockage of surface runoff. No additional payment will be made for furnishing additional pipe cover.

H. Drainage Ditch Restoration

Undercrossings of ditches shall be backfilled with imported granular backfill material or as approved to within the top one (1) foot of the ditch bottom. Place approved rock or rip-rap material in the top foot. Correct any ditch damage as a result of contractor's operations at no cost to the City. Payment for ditch restoration will be considered as incidental to the project.

I. Cold Mix Asphalt

Cold mix asphalt used for temporary repair of utility trenches or other small areas shall be placed by hand, then raked to a smooth and uniformly dense layer before compacting.

On large areas, which have been determined by the Engineer to be temporarily repaired with cold mix asphalt, the mix shall be spread with mechanical spreading equipment, such as a "Layton Paver," to a smooth and uniformly dense layer before compacting. In areas inaccessible to the mechanical spreading equipment, cold mix shall be placed by hand.

J. Resurfacing

Resurfacing, including asphalt patching, graveling, and landscaping shall be performed after the maintenance of trench backfill.

K. Settlement

Any settlement observed in the backfill, embankment, or in structures, including pipelines and manholes built over compacted material or embankment within the warranty period will be considered to be caused by improper compaction methods and/or pumping due to excessive moisture and shall be corrected and repaired at no cost to the City. Pipelines and structures which have settled shall be removed and reconstructed to the original condition at time of acceptance at no cost to the City.

**2.09.5** Payment

A. Unit Price

Payment shall be made at the unit prices as stated in the contractor's bid proposal for the backfill classification using imported materials. Native materials used for base, bedding and backfill shall be considered incidental to the unit price for pipe. Payment shall be

considered full compensation, including all labor, equipment, and materials for excavation, dewatering, backfill, compaction, hauling, maintenance, and testing, complete. Trench safety systems shall be at the unit bid price in the bid proposal.

Measurement shall be the length of the centerline of the pipe, fittings, and valves in place. Extra excavation and backfill at ends of pipes, fittings, and valves shall be considered incidental to the bid items. Trench excavation and payment for lump sum items shall not be paid for under this item.



**STANDARD SPECIFICATIONS**  
**CITY OF EDMONDS MODIFICATIONS**  
**DIVISIONS 3 THROUGH 8**

The following technical specifications shall be modified, clarified, or superseded as described below.

**5-04                    ASPHALT CONCRETE PAVEMENT**

5-04.3(4)            Rollers

Pneumatic tire rollers shall not be used unless specified in the Special Provisions.

5-04.3(17)          Paving Under Traffic

Open trenches within the traveled way or auxiliary lane shall have a steel-plate cover placed over them. A wedge of suitable materials, if required, shall be placed for a smooth transition between the pavement and the steel plate at the discretion of the Engineer. Warning signs shall be used to alert motorists of the presence of the steel plates.

5-04.5                Payment

Payment for tack coat shall be incidental to the bid items. Cold patch or temporary patch, as directed by the Engineer, shall be paid for as a two (2) inch thickness per unit measure as defined in the proposal.

**6-02                    CONCRETE STRUCTURES**

6-02.3(1)            Classification of Structural Concrete

Class 3000 concrete, minimum 5 1/2 sack (94 pound sacks) mix, shall be used for all concrete work, including sidewalks, curb and gutter, curbs, retaining walls, and small structures.

6-02.3(6)A          Weather and Temperature Limitations Protection of Concrete

A clear, not white, curing compound shall be brushed or sprayed on all exposed concrete immediately after the finishing work. Other protective measures for weather constraints are still required, including protection from excessive hot and cold temperatures (including wind chill).

6-02.3(12-13)      Construction, Contraction, and Expansion Joints

The following requirements apply to all curb, curb and gutter, and sidewalk work. Full depth expansion joints, consisting of 1/2 inch thick premolded material (AASHTO M213), shall be placed perpendicularly when abutting to existing improvements at each side of driveway cuts and at a maximum spacing of thirty (30) feet. Construction joints, consisting of a tooled two (2) inch cut or slice into the concrete pour, shall be placed at ten (10) foot intervals. Curb and gutter installations will require an additional two (2) inch cut or the installation of a 1 inch x 4 inch wedge into the heel of the pour. Tooled contraction joints shall be provided at five (5) foot intervals or as required to match existing improvements. All work shall be perpendicular and straight.

6-02.3(14)          Finish Concrete Surfaces

The finished improvements shall be true to grade, straight with smooth transitions or curves. Grade checked with a ten (10) foot straight edge placed anywhere on the slab in any direction and shall not deviate more than one-eighth (1/8) inch, and alignment shall not vary more than one-fourth (1/4) inch.

The finish shall be a light broom finish as approved by the Engineer in 1-05.6 Inspections. The City will not accept finishes that are non-uniform, overworked, discolored, spalling, damaged by weather, or where a cement layer has formed.

**7-04                    STORM SEWERS**

7-04.2                Materials

See approved material list MM-1 through MM-4.

7-04.3(1)           Cleaning and Testing

All pipes shall be tested for exfiltration.

7-04.3(3)           Add: Backfilling Storm Sewer Trenches

Storm sewer pipes shall be bedded and backfilled as specified in Section 2.09.

7-04.5                Payment

Same as water mains for pipelines. (See Section 7-11.5.)

**7-05                    MANHOLES, GRATE INLETS, DROP INLETS AND CATCH BASINS**

7-05.3(5)           Add: Connection to Existing Line, Catch Basin, Curb Inlet or Manhole (New Section)

Where shown on the plans, new sewer and/or stormwater pipes shall be connected to existing lines, catch basins, curb inlets and/or manholes. The Contractor shall be required to core drill into the structure, shape the new pipe to fit, and regrout the opening in a workmanlike manner. Where directed by the Engineer or where shown on the plans, additional structure channeling will be required.

7-05.4                Measurement

Replace paragraph four with:

Structure excavation Class B and structure excavation Class B, including haul, shall be included as part of the applicable unit or lump sum bid item.

7-05.5                Payment

Payment shall include adjustments of frames and grates to final grade. See Special Provisions.

**7-08                    GENERAL PIPE INSTALLATION REQUIREMENTS**

7-08.3(1)C           Bedding the Pipe

Pipe bedding for PVC pipe shall be placed to a depth of 6" below the bottom of the pipe and extending up 6" above the crown on all pipes.

The hand-placed bedding around the pipe and to a point 6 inches above the crown shall be rammed and tamped by use of shovels or other approved hand held tools so as to provide firm and uniform support over the full length of all pipes. All other requirements for pipe bedding shall be per Section 9.03.

Pipe bedding shall be considered incidental to the unit price for all pipe and no further compensation shall be made.

**7-09                    WATER MAINS**

7-09.2                Materials

See approved material list MM-1 through MM-4.

- 7-09.3(11)                    Compaction of Backfill  
See 1-06.2(1) Samples and Tests.
- 7-09.3(23)                   Hydrostatic Pressure Test  
Tests shall be between valves and made after all corporation stops are installed. Test pressures shall be 200 psig with corps installed, 300 psig without, for eight (8) inch pipelines and smaller, 200 psig for ten (10) inch pipelines and larger. Tests shall be for fifteen (15) minutes at 300 psig, two hours at 200 psig. A pressure drop of fifteen (15) psig or failure to meet loss requirement shall constitute rejection.
- 7-09.5                        Payment  
Payment also shall include thrust blocks, couplings, and restrained joints. Special connections or connection to existing pipelines shall be considered incidental unless a separate bid item is in the proposal. Separate bid items shall include all materials, equipment, and labor to make the connections. See Special Provisions.
- 7-12                         **VALVES FOR WATER MAINS**  
See approved material list MM-1 through MM-4
- 7-14                         **HYDRANTS**  
See approved Material List MM-1 through MM-4.
- 7-15                         **SERVICE CONNECTIONS**  
See approved Material List MM-1 through MM-4.
- 7-17                         **SANITARY SEWERS**
- 7-17.2                       Materials  
See approved materials list MM-1 through MM-4.
- 7-17.3(1)                   Protection of Existing Sewerage Facilities  
Add: When extending an existing sewer, the downstream system shall be protected from construction debris by placing a screen or trap in the first existing manhole downstream of the connection. It shall be the Contractor's responsibility to maintain this screen or trap until the new system is placed in service and then to remove it. Any construction debris which enters the existing downstream system shall be removed by the Contractor at his expense, and to the satisfaction of the Engineer. When the first manhole is set, the outlet shall be plugged until acceptance by the Engineer.
- 7-17.3(2)A                General  
See Sections 1-05.4 and 1-05.5
- 7-17.3(2)I                Add: Sewer Line Connections  
Add: Unless otherwise approved by the Engineer, all connections of lateral sewers to new ductile iron pipe or existing mains shall be made through a cast iron saddle secured to the sewer main with stainless steel bands. The main shall be core drilled.  
Concrete manholes shall be core drilled, and shall have either an "O" ring rubber gasket (i.e. Kore-N-Seal) meeting ASTM C-478, be manufacturer installed, or a sand collar.

7-17.4                    Measurement

Add:

All costs associated with structure excavation Class B and structure excavation Class B, including haul, shall be included in other contract pay items.

Add:

Measurement of imported granular trench backfill material for Class D material shall be by the lineal foot of pipe trench as described in Section 2-09.

7-17.5                    Payment

Add the following:

See the Special Provisions for a description of pay items utilized for the project.

**STANDARD SPECIFICATIONS**  
**CITY OF EDMONDS MODIFICATIONS**  
**DIVISIONS 9 - MATERIALS**

**9.03      AGGREGATES**

9.03.16      Bedding Materials

A.      Rigid Pipe

Bedding material for rigid pipe shall be free from wood waste, organic material and other extraneous or objectionable materials. Bedding material shall conform to the following gradations when tested in accordance with ASTM D422. Maximum particle size for ductile iron pipe shall be 1-1/2 inches.

1.      Base Material

Select: Selected excavated material for pipe base shall not contain particles larger than 5/8 inches.

Import: Imported base material shall be clean granular sand, or sand and gravel mix conforming to the following gradation:

Passing 3/4 inch square opening	100%
Passing 3/8 inch square opening	95% - 100%
Passing U.S. #8 sieve	0% - 10%
Passing U.S. #200 sieve	0% - 3%
Sand equivalent	35 min.

2.      Pipe Zone

Pipe zone material shall be crushed, partially crushed or naturally occurring granular material conforming to the following gradation:

Passing 3/4 inch square opening	100%
Passing 3/8 inch square opening	95% - 100%
Passing U.S. #8 sieve	0% - 10%
Passing U.S. #200 sieve	0% - 3%
Sand equivalent	35 min.

B.      Thermoplastic Pipe

Bedding material for thermoplastic pipe shall be free from wood waste, organic material and other extraneous or objectionable materials. Bedding material shall conform to the following gradations when tested in accordance with ASTM D422.

Pipe zone material shall be crushed, partially crushed or naturally occurring granular material conforming to the following gradation:

Passing 3/4 inch square opening	100%
Passing 3/8 inch square opening	95% - 100%
Passing U.S. #8 sieve	0% - 10%
Passing U.S. #200 sieve	0% - 3%
Sand equivalent	35 min.

Bank Run Gravel for Trench Backfill

All backfill material shall be free from wood waste, organic material and other extraneous objectionable materials. Material shall be uniformly graded from course to fine and conform to the following gradation when tested in accordance with ASTM D422:

1. Select

Maximum particle size for this material shall be 4½ inches.

2. Import

Passing 2 ½ inches square opening	100%
Passing 1 inch square opening	40% - 80%
Passing ¾ inch sieve	25% - 60%
Passing #40 sieve	8% - 30%
Passing #200 sieve	0% - 5%
Sand equivalent	50 min.

**CITY OF EDMONDS**  
**MATERIAL MODIFICATIONS**  
**DIVISIONS 7, 8 AND 9**

The following material specifications shall clarify, supplement and supersede where applicable the standard specifications.

**MATERIALS**

**A. City of Edmonds approved materials:**

**\* approved only when shown in the plan, proposal, or special provisions.**

**1. WATER SYSTEMS (test pressure 200 psi with corps installed, 300 psi without for 8" and smaller; 200 psi for 10" and larger)**

<b>MATERIAL</b>	<b>DESCRIPTION</b>	<b>MANUFACTURER</b>
Pipe	Class 52 ductile iron (AWWA C151) (or class as noted on plans)	
Fittings	Class 250 cement mortar lined cast iron or ductile iron (AWWA C 153)	
Nuts, bolts	Ductile iron or alloy steel A 303, grade B	
Mechanical couplings	Cast iron type for cast iron or ductile iron pipe, steel type for steel pipe	Rockwell Dresser Romac
Restrained joints	Flanged locking type pipe field lock gaskets uni-flange kwik-flange retainer gland couplings with anchor pins	US pipe, Clow US pipe US pipe Uni-Flange Standard Int Clow F 1058 Romac, Rockwell Dresser
Joint lubricant	U. S. Pharmacopoeia No. P39	
*Gate valves (10" and smaller, AWWA C500)	Clow Manhole No. 67 Kennedy Mueller	Clow Corporation Dresser Kennedy Valve Mueller Co.
Gate valves, resilient wedge (10" & smaller, AWWA C 509)	Clow Metroseal 250 Series 500 Mueller	Clow Corporation U. S. Pipe AFC American Flow Control Mueller Co.
Butterfly valves (10" & greater, AWWA C 504)	Groundhog Adap-Torq Linesal III	Pratt Kennedy Mueller Co.
Tapping valve	CI with MJ joints and tapping valve	Mueller, Clow
Valve boxes	Seattle Style 940	
Fire hydrants (all bronze fitted, 1-1/4" operating nut, AWWA C 502, international yellow paint), 4" Storz Adapter (with two 2-1/2" hose nozzles and one 4-1/2" NST pumper nozzle)	Centurion Guardian, K-81-A Reliant 929 Medallion B-62-B Pacer (WB-67-250)	Mueller Co. Kennedy Valve Dresser Clow American Darling Waterous
Combination air relief/vacuum relief valve (ARV)	Series 140c Model 202c Model UI-20	APCO Val-Matic Crispin

### Water Services and Connections

MATERIAL	DESCRIPTION	MANUFACTURER
Copper pipe (std service)	Soft, type K, ASTM B 88	
Polyethylene pipe (1-1/2" & larger services)	Driscopipe 5100, high molecular, high density tubing IPOD	Phillips
Service clamps (1-1/2" & larger, IP thread)	Model 313 Model 202S Model FS202 Model H-16113	Rockwell Romac Ford Mueller Co.
Ball Corp. stops direct tap with copper service (cc threads)	F600 H-15000, H-15008 4701-Q	Ford Mueller Co. A.Y. McDonald
*Corp. stops direct tap with polyethylene service (cc threads)	H-15005 47013-T	Mueller Co. A.Y. McDonald
Corp. stops with saddle clamps (1½" & larger)	FB 500 H-9968 4701-Q	Ford Mueller Co. A.Y. McDonald
Curb stops	B11 series Orisel II, H-10283 6101	Ford Mueller Co. A.Y. McDonald
Fittings - copper to copper	H-15400, H-15403 C22 series 4758-Q	Mueller Ford A.Y. McDonald
Polyethylene connections (1½" & larger)	Compression with stainless steel insert Pack joint with stainless steel insert 4758-3T	Mueller Co. Ford A.Y. McDonald
Meter boxes: <ul style="list-style-type: none"> <li>¾" – 1"</li> <li>1½" – 2"</li> </ul>	MS 11x18x12 with MS 11x18 ductile lid & reader MS 17x30x12 with MS 17x30 ductile lid w/reader	Mid-States
Tracer wire for 1" & greater polyethylene services	14 gauge, PVC coated copper wire	

### 2. SEWER SYSTEM (sewer pipe)

MATERIAL	DESCRIPTION	MANUFACTURER
Pipe	Concrete class 2 (non-reinforced)  ASTM C14 or AASHTO M 86  *Concrete (reinforced) ASTM C76 or AASHTO M 170  PVC, SDR 35, ASTM D3034	
Fittings and sewer service	Same material as pipe  PVC sand collars	
Manholes	Precast ASTM C478, 48" min. at bottom, top concentric to 24" opening  Flat slab, 8" min. thickness, 24" opening, steps ¾" galvanized deformed bar	
Manhole steps	Polypropylene, ASTM D-4101 material over ASTM A-615, grade 60 steel reinforcing bar, step to comply with ASTM C-478	Lane, MA Industries
Frames and covers	ASTM A48, class 40, cast iron, bituminous coated, "sewer" embossed in top	East Jordan Ironworks Model: 00370084
Transition couplings	Longitudinally bolted coupling with gasketed joints	Romac, Dresser, Rockwell



### 3. STORM DRAIN SYSTEM

MATERIAL	DESCRIPTION	MANUFACTURER
Pipe	*Concrete, reinforced, ASTM C76 or AASHTO M 170  Concrete (non-reinforced) ASTM C14 or AASHTO M86, class 2  *PVC, SDR 35, ASTM D3034	
	Aluminum CMP, AASHTO M196, 16 ga. or as shown on plans, gasketed and coupling banded	
	*Aluminum smooth wall pipe, 16 ga. or as shown on plans, recorrugated ends with annular bands and gaskets	Cascade Culvert, Kaiser Aluminum
	*PVC, SDR 35, ASTM D3034	
	Ductile iron, class 50	
	Perma-loc series 46 by J.M. Manufacturing Co.	
	HDPE; smooth interior pipe, watertight AASHTO M252, M294 Type S ASTM D 2321 ASTM D 1248 Type III Category 4 Grade P33 Class C ASTM D 3350 (2' Minimum cover under pavement areas)	ADS Hancor
Fitting	Same as pipe material  PVC sand collars	
Manholes	Precast ASTM C478, 48" min. at bottom, top concentric to 24" opening  Flat slab, 8" min. thickness, 24" opening, steps 3/4" galvanized deformed bar	
Manhole steps	Polypropylene, ASTM D-4101 material over ASTM A-615, grade 60 steel reinforcing bar, step to comply with ASTM C-478	Lane, MA Industries
Frames and covers	ASTM A48, class 40, cast iron, bituminous coated, "drain" embossed in top	East Jordan Ironworks Model: 00370082
Transition couplings	Longitudinally bolted coupling with gasketed joints	Romac, Dresser, Rockwell

### SUBSTITUTIONS

B.

MATERIAL	DESCRIPTION	MANUFACTURER
	Provide submittals for substitute materials to the Engineer for approval in accordance with the Standard Specifications	